TOOL DIE MACHINE
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THE NATIONAL TOOL AND DIE JOURNAL

TOOLS, DIES, JIGS, FIXTURES, MOULDS, GAGES, MACHINES
Design and Engineering
PRECISION SPECIALTIES
STAMPING and PARTS PRODUCTION
Official Publication
Special Tool, Die & Machine Shop Industry

MARCH
1937

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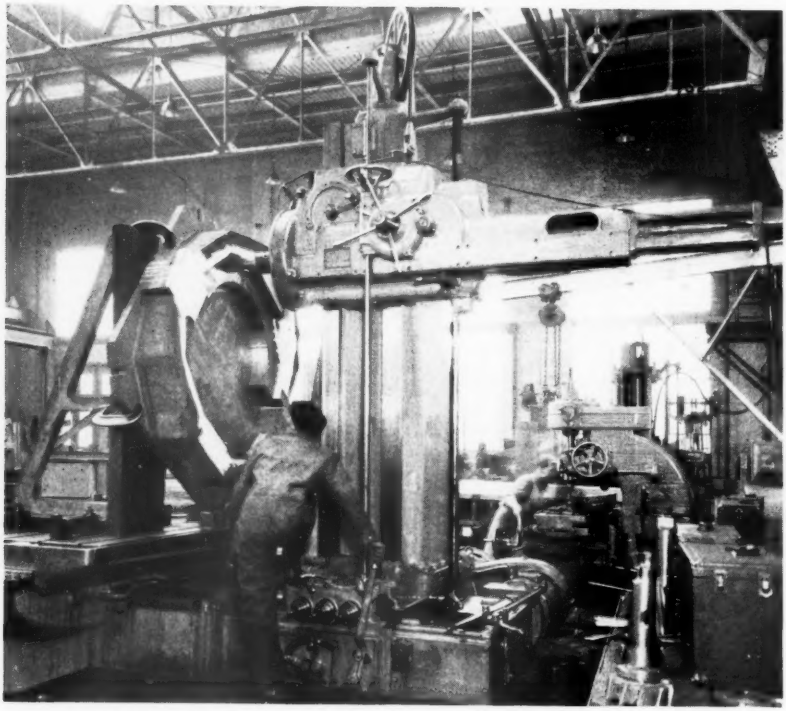

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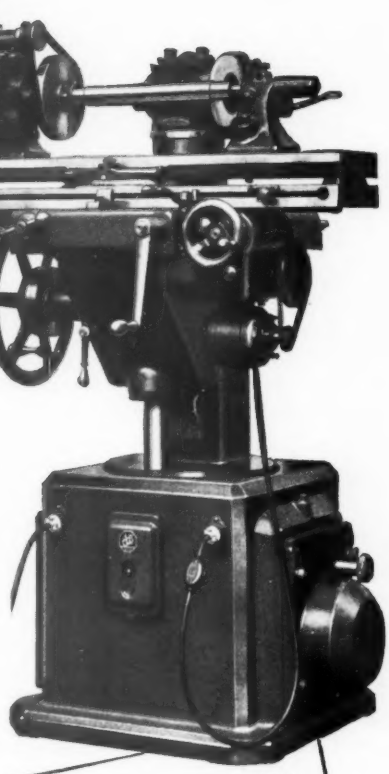

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Tool • Die • Machine
PROGRESS
The National Tool and Die Journal

March, 1937 Vol. 2, No. 12

Dies and Diemakers

By GEORGE A. VIS, President
Hovis Screwlock Company

This executive has drawn on his own experience for an interesting chronicle of the origin and development of sheet metal fabrication and of dies and punches. This is the first installment—the second will appear in the April number.—Ed.

SHEETS of copper, brass and precious metals have been fabricated in China and Japan for centuries, generally being made by beating an ingot of the metal with a hammer and gradually drawing it out into a thin sheet. The making of iron or steel into sheets did not come into any use until the process of making wrought iron by refining a ball of iron in an open fire was discovered. This made a malleable mass which could be forged and hammered and eventually worked out into sheets. This, I believe, was the origin, commercially, of sheet iron.

Thin sheets of this iron would rust away very quickly as compared with brass and copper, but it was discovered that by coating these sheets of iron with a thin layer of tin or lead, or a combination of the two, they would not rust and corrode; and this is the material of which the early sheet metal cooking utensils were usually made, generally in the form of folded sheet metal pans. This was accomplished mostly with hand tools, and by the use of brakes, hand rolling, and of course the ever present hammer. Sheet iron thus coated and with a little care would last a long time.

With the advent of ductile thin sheets, it was discovered that a hole could be punched without any apparent damage while the metal was cold, similar to the centuries-old blacksmith method of punching a hole in hot metal. Then someone discovered that it would be easier to mount the punch in a slide, in turn mounted in a frame, and kick it through the metal by foot power. This was another case of necessity being the mother of invention, because about this time many vessels and utensils were being fabricated by riveting sheets of metal together. This type of fabrication required many holes and the necessity was to find some easy way of putting them in. It followed that a punch did not necessarily need to be round, it could just as well be square, oblong, or even irregular in shape. It apparently punched the hole through the metal just as well.

Then some bright young man figured that if you could kick a punch through by foot power—why not rig up a steam engine crank on this frame and push the punch through the metal by mechanical means, steam engines having arrived at this time as a more or less satisfactory means of making wheels go round. I do not doubt but that while this was going on a great many of the old timers took a look at some of these slugs or pieces that were punched out and said, "Why don't we make a big punch and punch out something we can use"—in other words, instead of making a small hole in a sheet of metal they could just as well make a big hole, save the hole and throw the sheet away. Experimental work is always expensive, so not much was done until there began to be a demand for larger quantities of these small pieces of sheet metal.

About this time, oil was discovered in Pennsylvania. It was soon found that it could be distilled and, in getting some of the lighter products, that something which would burn could be produced. They had quite a time selling the world on the fact that it was better than whale oil, and if not better, at least cheaper and had a lot more uses. Then began the decline of the old tallow candle, and it was not very long before every city and farmhouse in the United States was lighted with kerosene lamps or lanterns. Now was the time when the boys who stood around wondering what they could do with the pieces of metal that were knocked out with the punch had their inning. The country had taken to the new oil. Kerosene lamps with tin oil pots and brass wick tubes were in demand and hundreds of thousands of small sheet metal parts were required—thus the beginning of what we now call the punch and die.

The dies for these early parts were very primitive. The oil pots were made with flat bottoms and the sides from sheets of metal rolled and soldered, the fancier ones having a spun metal top to make them more attractive. In these early days of sheet metal manufacture, cutting and piercing it and with due caution flanging it slightly around the edges, was thought to be the extent to which it could be fabricated, excepting of course the making of straight bands or brakes by the old hand working process.

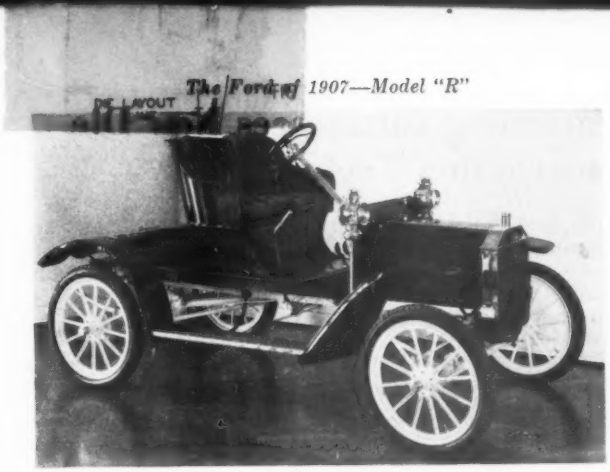
After the oil market in the United States and some parts of Europe apparently had been saturated, the oil producers started out to prove to the Chinese that they could better afford to use kerosene than peanut oil for lights. Shipping from the United States to the Orient and to South America and other foreign countries in those days was done largely in commercial sailing vessels. Steam ships were being used, but the bulk of the freight was being carried in sailing ships. To ship a load of kerosene to China, Africa or other parts of the world equally distant was a matter of weeks, sometimes months. The same properties that made kerosene so efficient in a lamp made it exceedingly difficult to handle as a ship cargo. It seemed to be able to make its way out of almost any kind of a container and thoroughly saturate everything in its vicinity with its pungent odor. This did not work out very well in the hold of a boat when kerosene was in a mixed cargo with food stuffs, cloth, and other miscellaneous articles, and frequently a cargo worth many thousands of dollars would arrive in a foreign port, after weeks of hard going at sea, completely ruined. Here was a very grave problem.

Then it was discovered that if kerosene could be put into tin cans and soldered up tight, barring accidents, it would stay inside the cans where it belonged. A square tin can holding five gallons was developed and came into immediate use for this purpose. It was made square because that shape took up less room in the hold of a ship, also because it cut to better advantage and was less waste out of the standard size sheet of tin. Probably one-half of all the miscellaneous small pieces of tin which appeared in all parts of the world in the latter part of the nineteenth and early part of the twentieth century came from the five-gallon tin cans in which kerosene was received from the United States. Tin roofs blossomed out even in deepest Africa and the South Sea Islands.

Enormous numbers of tin cans were required to ship these quantities of kerosene all over the world. They were being bought largely by a big corporation which had the money to spend to find out how to make tin cans inexpensively, and here was really the first opportunity to develop the forerunner of our present die in a big way. Dies were made to blank the bottom of the cans, the tops, the little filler necks and caps, and the handle clips. Machinery was developed for folding and lockseaming the can bodies, also for automatically soldering the parts together.

After the success of shipping kerosene in tin cans to all parts of the world, it was realized that cans could be adapted to other products, but it was not until the invention of vacuum sealing that the canned food industry began. Although early canned food products had very little domestic use they followed the tin cans of kerosene to outlying parts of the world where such foods and delicacies were not to be had.

The diemakers of this era were more or less stymied because they were working almost entirely in tin plate. Apparently the tin plate manufacturers of that



The Ford of 1907—Model "R"

day could not make large sheets, most of it being produced in sheets approximately 18 x 24 inches, and every tin can made was so designed that it could be economically cut from this size sheet. In fact, tin cans are still being made to a large extent under these conditions.

With the turn of the century a lot of things happened. A man in Dayton, Ohio, began to make every corner grocer conscious of the fact that he should have a nice new shiny metal cash register, which would tell him how much money he had put into it. This business began to be a great success. There were a lot of small gadgets inside one of these new registers that could be made with a punch and die from sheets of metal much more economically than they could be made by other processes. This method assured a much higher degree of accuracy at lower cost than could be obtained by any other method. This resulted in the manufacture of more dies and further development of the industry. After all, the need for quantity production is the "big reason" for the die industry.

We had now reached the period when several men in different parts of the world began to build horseless carriages. A few of them became commercial successes. Some of them never got into large production although they were built for varying periods of years. Then some automobile manufacturers began to produce, in what were in their time appalling quantities, but the demand had begun and they continued to build in ever increasing numbers. Here was the beginning of the use of sheet metal in a really big way. In those days, as now, the automobile builder was a relatively large manufacturer. He could afford to spend what was necessary for experimenting and to determine whether a part could be made from a piece of sheet steel less expensively than it could be made from a forging or casting, or machined from the solid.

It was during these years of sheet metal development that a man in Buffalo had the temerity to say that he could take a piece of flat sheet metal and put it into one of those new fangled power punch presses and "push it down" into the form of a dish, either rectangular or round, without folding the corners or resorting to any of the old-time schemes of producing this form of utensil. It was this development that made possible the design and construction of the predecessors of the Ford Model "T" car, the "R" and "S" models, which had a sheet

(Continued on page 29)

The Ford of 1908—Model "S"

its pungent odor. This did

Contour Machining Introduces New Die Construction Technique

By R. J. WILKIE, Vice President
Continental Machine Specialties, Inc.

THE new process known as contour sawing is particularly applicable to die construction. It makes possible a practical method of using the "slug" or scrap cut from the die. This slug in ordinary machining processes is reduced to chips or made unfit for use.

By machining out the slug with the contour saw — cutting at an angle determined by the die thickness — the slug can be used as a punch. In addition to eliminating the time ordinarily required to rough out the punch and die there is a saving of the material that would have been used for the punch.

To accomplish removing the slug so that it may be used as the punch, three steps are observed. The starting hole for the saw is drilled as shown in Fig. 1. It is started inside of the die lay-out line, intersects the die lay-out line at the center of the die block and emerges through the die block on the opposite side outside of the die lay-out line.

The narrow blade precision saw is then inserted through the die starting hole and the ends of the saw are welded together. The machine table is tilted so that the table angle is a few degrees less than the angle in which the hole has been drilled. The slug is completely sawed out at this angle. The path of the saw on the surface is entirely inside the lay-out line. Thus at the proper cutting angle the bottom of the slug that is to be removed will have material outside of the die lay-out line.

When the punch is removed the excess material on both the punch and die is filed off to make the "land" on the die and "straight sides" on the punch.

The angle of the saw cut and of the drilled hole in which the saw is started, depends on the die thickness. The following table gives the correct angle for producing the maximum amount of "straight side" on the punch and "land" on the die.

TABLE FOR DETERMINING DOALL DIE MAKING TECHNIQUE

Die Thickness	Angle of Saw Starting Hole	Angle for Saw Cut	Distance of Saw Kerf from Die Layout Line	Diameter of Drill	Width of Starting Saw	Amount of Straight Sides on Punch and Die
1/2"	21°	18°	3/32"	1/8"	3/32"	5/32"
3/4"	18°	15°	3/32"	1/8"	3/32"	1/4"
1"	14°	11°	3/32"	9/64"	1/8"	3/8"
1 1/4"	12°	9°	3/32"	9/64"	1/8"	1/2"
1 1/2"	11°	8°	3/32"	9/64"	1/8"	9/16"
2"	10°	7°	3/32"	13/64"	3/16"	5/8"
3"	9°	6°	1/8"	17/64"	1/4"	11/16"
4"	9°	6°	1/8"	17/64"	1/4"	11/16"
5"	9°	6°	1/8"	17/64"	1/4"	11/16"
6"	9°	6°	1/8"	17/64"	1/4"	11/16"

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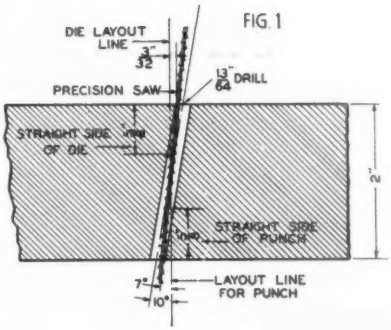

FIG. 1

The angle can be varied to produce more "straight side" on the punch or on the die, whichever is required. Forging dies, for example, require considerable relief in the die and therefore would be drilled and cut at a greater angle than shown.

Procedure is Simple

The consecutive steps for removing the slug from the die and shaping it for the punch are:

1. Make the die lay-out using regular methods.
   A. Lay out an inner line on which the saw will travel. The distance of this line inside of the die lay-out is determined by the angle of the cut as shown in the table.
2. Drill a starting hole (or holes if the die contains more than two sharp corners). Use the angle recommended for the thickness of the die to be cut. The diameter of the drill is also determined by the thickness of the die to be cut. The drilled hole will then start inside of the die line on the top and will penetrate outside of the die line on the bottom.
3. Insert the saw through the starting hole and weld the saw ends together. If the die to be cut has a large amount of lineal surface, a wider saw can be substituted for the starting saw as soon as an opening large enough to accommodate it has been sawed out. The angle of tilt on the table should be a few degrees less than the angle of the drilled hole (see table).
4. Saw the punch out of the die.
5. When the punch has been removed, the lay-out for finishing the punch is made on the larger end. Center

(Continued on page 30)

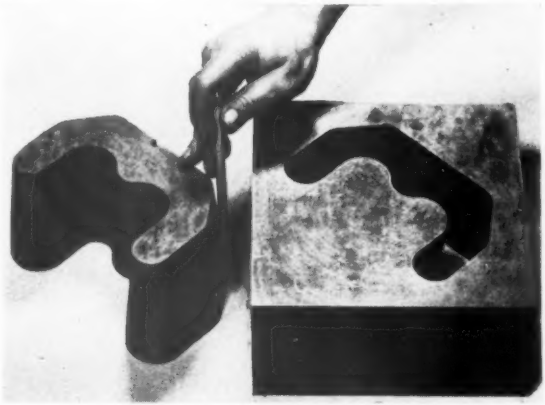

Fig. 2—The punch and die of this 3" thick trimming die sawed out complete in one hour, 40 minutes. Note the starting hole has completely disappeared. Die layout line can be seen on die.

Fig. 3—After sawing this 1" thick die in 28 minutes, filing and fitting were completed in one hour, 50 minutes. Note starting hole disappears on "straight side."

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A New High Production Rotary Polishing Machine

THE newest member of the Sommer & Adams line of continuous polishing equipment is the Rotary Polishing Machine illustrated here. Designed especially for polishing of automobile hub caps and similar parts and products, this new model is of the circular indexing type. To insure absolute rigidity, the center column is mounted on a substantial base which carries also the indexing table on which operate a series of rotating spindles. Each of these has mounted on it a specially designed chuck for holding a hub cap.

The center column of the machine carries overhead supports on which the polishing wheel spindles are mounted with both vertical and radial adjustments, as well as an adjustment angularly to the wheel spindle. The latter assures proper continuous presentation of the polishing wheel to the contour of the work piece. But also with this construction, the polishing wheels at all times face the operator so that they are accessible for the necessary changes to be made, in the shortest possible time.

In operation, the work is loaded in an automatic chuck while the work spindles are at rest. The machine table then indexes, bringing a work piece under the first polishing wheel, where the piece is automatically rotated. Each

(Continued on page 27)

When you order or write about products described in TDM PROGRESS please mention the publication.

New Magnetic Chuck Assures Quick, Accurate Adjustment for All Angle Grinding

THE set-up of material for grinding or checking is often complicated by the necessity of adjusting work to angular positions. A product introduced to the trade last year—the Magna-Sine, manufactured by the Robbins Engineering Company, Detroit, Michigan—has filled the long-felt need for a chuck that can be quickly and easily adjusted to both single and compound angles, and by magnetic principle hold the material securely in place.

The Magna-Sine is furnished in two styles, one for adjustment to a single angle, and another that can be tilted to compound angles. Illustration Number 1 shows the construction of the latter style, which consists essentially of a base which is placed on the table of the machine, a plate which is hinged at one end of the base, and the magnetic chuck table which is hinged to the plate at right angles to the plate hinge. Illustration Number 2 shows the single angle model. Cylindrical bars extend across the under side of both the plate and the chuck table. Standard gage blocks are employed to determine the angle, and are placed so that in every case the cylindrical bar rests firmly on the top of the gage block.

As is clearly indicated, set-ups can be made in a very short time. As the Magna-Sine is perfectly squared and ground and lapped to the closest precision limits, when used with precision gage blocks, it assures the production of extremely accurate work. It may be set up from any side or any surface. As no clamps or bolts are required to hold the material in place, even the smallest and most delicate pieces can be ground safely and accurately. The latter statement may be borne out by the fact that the Magna-Sine is now being used in production grinding by one of the world's leading watch manufacturers. In checking work on the grinders, it is only necessary to check the gage and position of the blocks.

The Magna-Sine is furnished in two sizes, with tables 10¾ and 7 inches long and the widths being 6 and 5 inches.

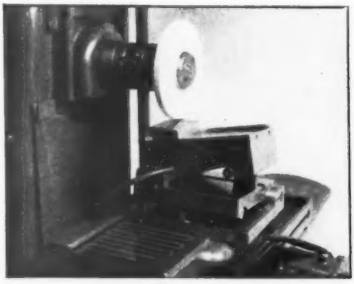

Fig. 1

Hinge centers on the large model are 10 inches apart, and 5 inches on the smaller Magna-Sine. The large model can be placed on the grinder as a permanent part of the machine. The small Magna-Sine can be used as a utility tool, being moved to wherever it is needed, or also attached permanently to the table.

From the experiences of the concerns now using the Magna-Sine, its flexibility for grinding and checking appears almost unlimited. However, a few of its many applications to various types of work are shown in the accompanying illustrations. Illustration Number 1 shows the Magna-Sine adjusted for grinding a compound

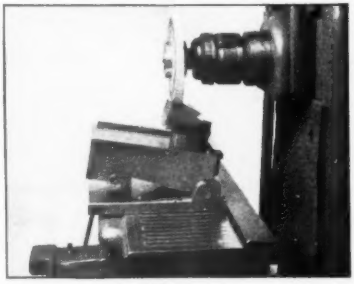

Fig. 2

angle on the face of a block. The combination of angles in this case was 5° 10′ 32″ and 10° 31′. A set-up similar to this can be completed, ready for grinding, in a few seconds' time. Number 2 shows the single angle model Magna-Sine being used for the grinding of a dovetail. It will be noted that, because of a wide range of possible adjustments of the sine table, it is only necessary to dress the wheel to one angle—making possible a definite saving in grinding

(Continued on page 35)

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THE
INTERNATIONAL
TOOL COMPANY
J. J. KOHL,
Pres.
DAYTON, OHIO

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A Thought . . .

on STABILIZED RELATIONS

The greatest satisfaction for the BUYER and USER of Dies, Jigs, Fixtures, Special Gages, etc., is obtained from TOOL and DIE SOURCES when the buyer and the seller have a thoroughly mutual confidence in each other—the tool and die shop able to rely on his customer to keep him supplied with a steady volume of work whenever it is available without fear that the business will be withdrawn upon the slightest pretext and without the constant harassment of promiscuous and often unprincipled price competition—and—the customer able to rely upon his DIE and TOOL SOURCE for prompt and reliable delivery service and workmanship in line with his standards; knowing that his requirements have been anticipated by close co-operation and capacity reserved accordingly; and knowing that he will not be let down in his hour of need. Such relations make for stabilization of business and employment.

After all—every individual, firm or corporation is both a buyer and a seller.

In industry—then—it would appear timely that every practice or tendency causing unstable conditions in business be universally curbed and if possible eliminated.

NOTE—There will appear on these pages, from time to time, various "Thoughts" pertinent to business in general and the Tool and Die Industry in particular. We invite comment.

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Holo-Krome President Chosen to Head Billings & Spencer Company

W. A. Purtell Elected President of Old Established Tool and Machinery Manufacturing Firm. James Allison New Factory Manager

AT its annual organization meeting, held Feb. 15th at the Hartford Club, the Billings & Spencer Company of Hartford, Conn., elected W. A. Purtell, president of the Holo-Krome Screw Corp., as its president. Frederick C. Billings, for many years president of the company, will continue his active interest as chairman of the board.

Other officers re-elected were W. Roy Moore, vice president and general manager; Howard E. Oberg, vice president; and M. Michman, secretary-treasurer. The company also announces the appointment of James Allison, field service metallurgist for the Union Drawn Steel Co. in New York and New England area, as factory manager.

Billings & Spencer have been well known for many years as specialists in the manufacture of drop forged tools and machinery. They report substantial increases in business this year and are at present employing the largest force they have had in many years. Marked progress has been made in metallurgical research during the past several months.

As president of the Billings & Spencer Co., Mr. Purtell will not relinquish any of his duties at Holo-Krome, where *Fibro Forged* socket screws are manufactured, but assumes active management of both companies. For the past several months he has served as director and as chairman of the management committee for the former concern.

Mr. Allison has had extensive experi-

(Continued on page 37)

MARSHALLTOWN
PUNCH PRESSES

- Designed for speed, safety, durability, and economical operation and maintenance.
- Unusual features include large die space and chrome nickel steel crankshaft.
- Produced in sizes from 10 ton to 70 ton capacity and in flywheel, geared, convertible geared and motor driven types.
- Distributors in Principal Cities.

WRITE FOR LITERATURE

MARSHALLTOWN MFG. CO.
913 East Nevada Street
MARSHALLTOWN, IOWA, U.S.A.

When you order or write about products described in TDM PROGRESS please mention the publication.

Accuracy—A Prime Factor in Success of Carboloy

Grams, Microns, Degrees, Time and Ten Thousandths Whipped Into Line in Its Production

By JACK L. LYONS, M.E.
Lyons Machine Company

WHEN shop men marvel at Carboloy producing fine finishes and accurate surfaces, they probably do not realize that accuracy is one of its parents.

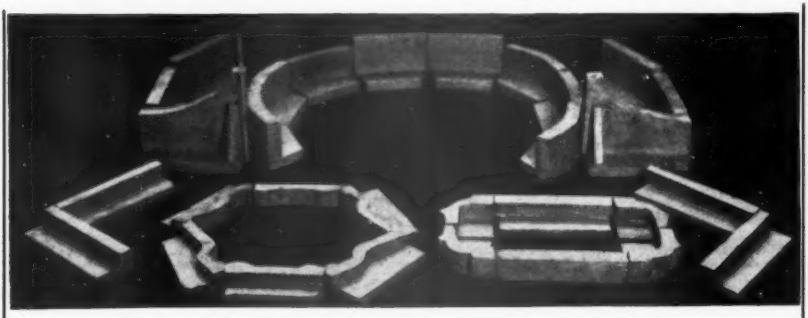
From their very inception, cemented carbides are the embodiment of qualitative and quantitative precision. The Carboloy Company spares no expense to insure rigid control of every operation connected with this remarkable material. Grams, microns, degrees, time and ten thousandths are whipped in line to form a firm foundation for a uniform product.

Scientific process, excellent equipment and accurate control are employed to extract tungsten from the ore. This is purified to the highest degree.

Carbide is a compound of pure metal and carbon. The carbon in this case is formed by lamp black which is thoroughly mixed with the tungsten and treated in an electric furnace charged with hydrogen atmosphere. This produces tungsten carbide, which has the same relation to Carboloy that an abrasive has to a grinding wheel.

In order to produce a homogeneous and uniform material, it is necessary to select the smallest and most uniform particles. An instrument that magnifies 3000 times is used for this purpose. Most of these particles of tungsten carbide are 2 to 3 microns in diameter. One micron is 39 millionths of an inch. Imag-

(Continued on page 31)



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Any Size... Any Shape... Any Grade.
Made to any Specifications.
Reduce Die Costs 25% to 40%.

Write for Information and Valuable Booklet

AJAX STEEL AND FORGE Co.
17225 NEWBERN STREET DETROIT, MICHIGAN

When you order or write about products described in TDM PROGRESS please mention the publication.

The Spring Handbook

IT has nothing to do with the weather, nor will it help in the spring gardening, but it does set forth the most authoritative data on the Art and Science of Spring Making.

From the great amount of sales literature which crosses an Editor's desk, this catalog stands out as another excellent example of the recent tendency to place in the hands of prospective buyers really valuable data.

Springs are so universal in their use that it is well-nigh impossible to name any manufactured product with which a spring application of some sort is not associated, either as a part of the product itself or in the means used to produce it.

In this practical handbook of modern spring engineering, Barnes-Gibson-Raymond have compiled facts which should be in the possession of every individual who is responsible for the design, selection or purchase of springs of any type.

Not only are characteristics of the many spring types discussed, but numerous problems in design are actually worked out for easier understanding in the book. The subject matter is clearly indexed and conveniently grouped for reference.

Barnes-Gibson-Raymond, a division of the Associated Spring Corp., is a consolidation of three of the oldest spring makers in the industry. With plants in Detroit and Ann Arbor, Mich., the heart of the automotive industry, the company has achieved much in the development of better springs. Research and laboratory experiment have always been a strong suit in these two spring plants and the results are apparent in the tables and formulas which have been compiled for quick, accurate use. Both plants have experimental and testing laboratories in which it is possible to make tests under actual operating conditions. Stroboscopic equipment is used in making studies under slow motion.

Engineering research is extremely

(Continued on page 26)

OVERHAULING VS REBUILDING

Constant breakdowns and their resultant losses are frequently due to faulty OVERHAULING.

Restore original efficiency of worn and inefficient equipment by a thorough REBUILDING.

REBUILT by ENTERPRISE

means just this—

— Completely rebuilt from the bed to the last pin —

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ENTERPRISE MACHINE PARTS CORP.

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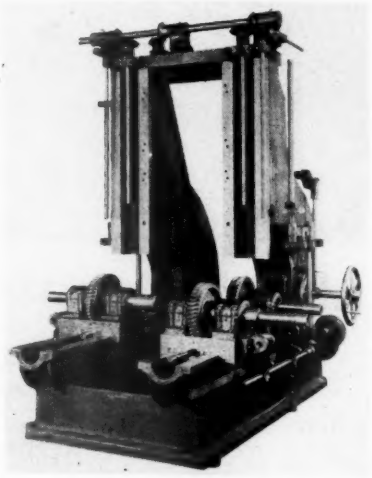
DETROIT



When you order or write about products described in TDM PROGRESS please mention the publication.

New Sheffield Comparator

IN an effort to meet the requirements of shops who do not feel that their class of work justifies the purchase of gages possessing the advantages of *Sheffield Visuals*, the Sheffield Gage Corporation announces an entirely new comparator type instrument which, with its considerably lower price, should make comparator gaging economically available to most tool shops.

This new comparator retains many of the exclusive features of the *Sheffield Visual Gage*. The gaging head, similar to that of the *Sheffield #3 Visual*, utilizes the patented Sheffield fine adjusting sleeve for rapid, easy movement of the dial hand to the final setting. The gaging head is raised and lowered by a convenient hand wheel on the right, which provides smooth, free adjustment to the proper height above the lower anvil. The clamping wheel on the left quickly and surely locks the head at the precise height.

The entire gaging head may be

(Continued on page 27)

SAFETY WHEELS - *Are Preferred for Tool Rooms*

LITAN	}	For Cool and Rapid Cutting
#99 WHITE	}	For Alloys—Hard and Soft
#99 PINK	}	For Carbon Steels—Hardened

For general purpose tool room work, wheels made of our #9 Rex or #109 Rex cut as well and last longer and are less expensive than the highly refined abrasives mentioned above. These wheels are made in all sizes and standard shapes; also of any practical grain and grade specifications.

The SAFETY GRINDING WHEEL & MACHINE Co.

2483 COLUMBUS AVE. SPRINGFIELD, OHIO

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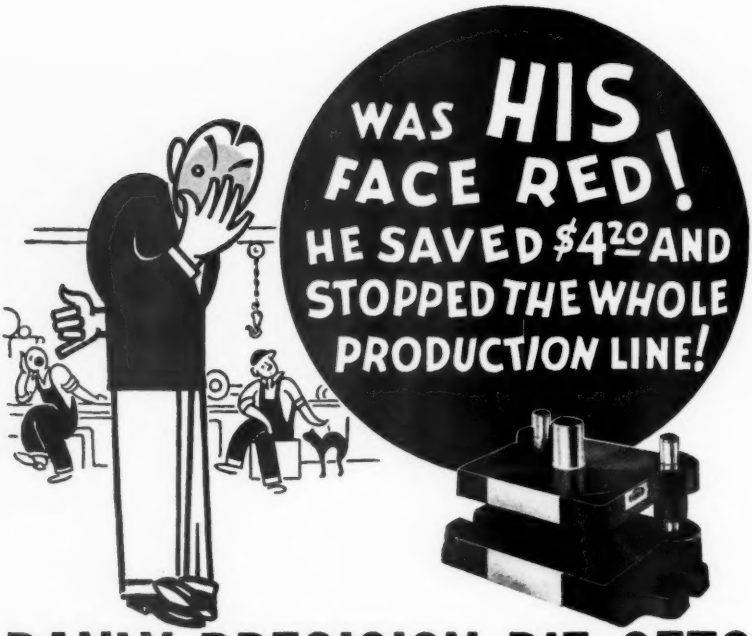
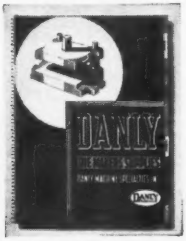


DANLY PRECISION DIE SETS

STAND UP LONGER—GIVE MORE ACCURATE PARTS



The Danly Catalog gives you the easiest way to select the proper die set for every job. Your copy sent upon request.

● It's a matter of sound good judgment to spend the slight difference for the greater accuracy and longer die life you get with a Danly Precision Die Set. With pins ground and lapped to within ±1/10,000″ and bushings ground and honed to the same tolerance, you have many times the accuracy of ordinary die sets. That's what makes Danly Precision Sets more dependable . . . why Danly-made parts are more accurate . . . why your dies last longer and protect you against costly breakdowns and time wastes in production. Investigate the difference. Write us today.

DANLY MACHINE SPECIALTIES, Inc., 2121 S. 52nd Ave., Chicago, Ill.

Long Island City, N. Y., 36-12 34th Street
Dayton, Ohio, 990 E. Monument Avenue
Detroit, Michigan, 1549 Temple Avenue
513 E. Buffalo Street, Milwaukee
Rochester, N. Y., 16 Commercial Street
Cleveland, Ohio, 1444 East 49th Street
Philadelphia, Pa., 3913 N. Broad Street

DANLY PRECISION DIE SETS

When you order or write about products described in TDM PROGRESS please mention the publication.

JOE'S UP IN THE AIR AGAIN!

And who wouldn't be—with these pesky pins that don't fit. Get 'em halfway in and they're stuck—and so are you! *Try* and get 'em out! It's good economy to spend just a few more pennies and be sure of the accurate fit you get with Genuine Danly Dowel Pins.

DANLY DOWEL PINS

FIT PERFECTLY EVERY TIME

● A few cents more, sure, but they're worth it because they are accurately ground to within one ten-thousandth of an inch. That means a perfect fit. They're made of a special steel, carburized and hardened. All diameters made in two sizes: The Standard being (.0002) two ten-thousandths of an inch, and the Oversize (.001) one thousandth of an inch over listed diameters.

Danly Precision Dowel Pins eliminate delay—there is no trying or fitting—no lapping of holes—they save you time and money. Try them next time and see the difference.

DANLY MACHINE SPECIALTIES, Inc., 2121 S. 52nd Ave., Chicago, Ill.

Long Island City, N. Y., 36-12 34th Street ● Rochester, N. Y., 16 Commercial Street
Dayton, Ohio, 990 E. Monument Avenue ● Cleveland, Ohio, 1444 East 49th Street
Detroit, Michigan. 1549 Temple Avenue ● Philadelphia, Pa., 3913 N. Broad Street
513 E. Buffalo Street, Milwaukee

DANLY DIE MAKERS' SUPPLIES

When you order or write about products described in TDM PROGRESS please mention the publication.

News of Cleveland TDM Shops

TOOLS & Gages, Inc. of Cleveland, O., a TDM Shop, announces the installation of a *Model BB-49* Hardinge *Cataract* Precision Bench Lathe, with all standard and special attachments.

Hardinge Lathe construction embraces the enclosed headstock with preloaded ball bearings providing extreme accuracy and high spindle speeds with the bearings requiring no adjustment. Model BB-49 installed by T & G Inc. has a length of bed of 36 inches and a swing of 9 inches. The driving unit provides a high spindle speed of 3900 r.p.m.

W. L. Davis, who for the past seven years has been manager of the Romek Pump Co., Elyria, Ohio, has been appointed factory manager of the Lyons Machine Company of Cleveland.

Mr. Davis had previously been with Lyons for six years prior to his affiliation with the Elyria concern and is thoroughly experienced in the building of special machinery, tools, jigs and fixtures.

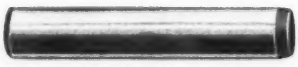
The McKinney Tool & Manufacturing Co., 1688 Arabella Rd., Cleveland, O., a TDM Shop, announces the appointment of G. A. Richie as sales representative in Dayton, Ohio, and for the state of Indiana, with offices at 425 Chamber of Commerce Bldg., Indianapolis.

Mr. Richie's experience qualifies him particularly to advise in the installation of roller die forming machines, automatic flying saw and shear cut-off and bending machines.

J. R. Fitzsimmons, Manager of the Cleveland branch of Danly Machine Specialties, Inc., announces the removal of the office and plant on April first to 1745 Rockwell Ave.

An ever increasing demand in the Cleveland territory for Danly precision die sets and die makers' supplies has been taxing the branch's facilities for some time. Larger space and more convenient location of the new quarters will speed deliveries.

STANDARDIZED
DRILL JIG BUSHINGS
LEADER PINS *and* BUSHINGS
DOWEL PINS



● Send for Complete Catalog or Specific Data Sheets ●

We also Specialize in Complete Machine Part Manufacture Requiring Extremely Close Limits, Lapped Fits, etc., for Pressures up to 15,000# per Square Inch

ACME INDUSTRIAL CO.
206 No. Laflin St. • Chicago, Ill.

When you order or write about products described in TDM PROGRESS please mention the publication.

Chicago Division Holds Annual Dinner Dance

THE *Bal Tabarin* in Chicago was the scene of a very festive affair on March 6th when the Chicago Division of the Special Tool, Die & Machine Shop Institute held their annual mid-winter dinner dance there.

About 250 turned out for the occasion and reports from guests indicate that the dinner was excellent, the floor show very sophisticated and highly entertaining, and that a large evening was had by all.

Miles Irmis headed the committee in charge of the party, having as his assistants Karl Harig, President of the Chicago Division; Harry Appel; Roy Lindberg, and William Phares, Secretary of the Division.

Other officers of the local group are E. W. Fritzell, Vice President, and Carl Danielson, Treasurer. The executive committee includes, in addition to the officers, Mr. Irmis, Rudolph Bernhardt, Rudolph Krasberg, and John Winzeler.

CONTRACT DIE AND PUNCH MANUFACTURERS

Follow This Method to Reduce Your Profit Risk

A Hovis Screwlock group punch plate and corresponding button die plate.

These plates, as illustrated, were delivered to a contract die shop, with guaranteed accuracy at a fixed price. . . . A standard die shoe—fully guaranteed by the maker—was added. Standard springs, screws, and dowels, all obtainable at fixed prices—were used. . . . RESULT: A complete die except for the stripper and the mounting of the two plates which represent a labor cost of not more than 10% of gross selling price. Thus Guaranteed Standard Parts assure your profit. . . . Our experience is at your service.

Write for descriptive circular of Screwlock patented principle.

HOVIS SCREWLOCK COMPANY

3129 EAST LARNED ST., DETROIT, MICHIGAN

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PROGRESS

Published in the interest of
Manufacturers and Users of
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Official Organ of the
SPECIAL TOOL, DIE AND MACHINE SHOP INDUSTRY
More than 3500 Members in the U.S.A.

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A National Trade Association
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Pres.-G.M., Ex-Cell-O Aircraft & Tool Corp.
Secretary—GEORGE J. HUEBNER
Cleveland, Ohio

Recognition Achieved

THE step-child of industry—the contract manufacturer of special tools, dies, jigs, fixtures, molds and special machines—comes into his own at last with the growing recognition gradually being accorded to the Special Tool, Die and Machine Shop Industry by the industrial public.

For years the shop owner, whose products of skill—tools, dies, special machines—are a vital necessity to practically every production industry, has gone his solitary way, interested primarily in the perfect building of his product and content to accept whatever business came to his door, frequently at prices the customer suggested.

Today, however, thanks to several different circumstances, that member of Industry is no longer a lone wolf but one of a group of some 4000 whose interests are protected and promoted by a national Institute and whose high skill and real worth to Industry are for the first time gaining the recognition they deserve as an important nation-wide industry.

In December 1936 the *American Machinist*, one of the foremost industrial publications, carried a full page describing the activities and organization of the Special Tool, Die and Machine Shop Institute. The article was written by Frederick S. Blackall, Jr., President of the Institute, at the special request of the editors of the magazine. We quote from a portion of it:

"The important place which tool, die and machine shops play in rendering possible the mass production in which America leads the world is too often overlooked by industry at large; and the Institute, through its official publication (T·D·M PROGRESS) and through contact with trade journal and general publications, has done good work in advertising the industry's services and wares."

One of the country's outstanding house organs, *Esso Oil-Ways*, published by the Standard Oil Companies of New Jersey, Pennsylvania and Louisiana, in its February 1937 number, devoted two pages to a story on the work of special tool, die and machine builders in an article entitled "The Hole Truth." This article is especially concerned with the work of the Moore Special Tool Co., of Bridgeport, Conn., one of the members "in good standing" in the Institute and builder of precision jig borers as well as other TDM products. The story is illustrated with pictures made in the Moore plant, but it calls attention particularly to the Institute, its membership, its activities, and likewise emphasizes the unusually important character of the work of the Industry in general. The following quotations indicate the interest shown in the TDM Industry.

Speaking of accuracies of one-millionth of an inch which have been attained it comments: "To the tool maker must go credit for this accuracy. In the factory, machine shop, or specialty shop he is the individual upon whose shoulders rests the burden of making special machines, tools for cutting metal, dies for forging, pressing, and stamping, fixtures for holding parts being machined, jigs for guiding drills, and other tools and gages for measuring accuracy of work. Astonishing it is that a large number of these mechanical wizards are located not in factories that make our products, but in

Mr. T·D·M Industry Member:
Are you reading this editorial? If not, won't you do it now? It tells some interesting facts about your Industry and should make you think mighty well of it.—Editor.

independent shops, sometimes called jobbing tool shops. . .

"Few sections of the country . . . are without their special tool makers, some employing a few men doing a small volume of ordinary machine work annually, others employing thousands of men to produce millions of dollars' worth of articles every year and turning out extraordinary precision work of highly specialized nature. So important has this group of specialists become that many of them now are part of an association called the Special Tool, Die and Machine Shop Institute. Employing the most skilled labor in the land, these thousands of shops represent a great aid to industrial organizations large and small.

"In these shops the persistent inventor may have his device perfected. Local manufacturers too small to maintain their own tool rooms may call upon them to produce and recondition the tools. Large producers the nation over may use one, a dozen, or a hundred of these shops to take care of work their own tool rooms cannot handle because of lack of facilities or personnel. Large and small manufacturers may want a special machine designed and built. Such work often is turned over to these special tool makers. Again, a large manufacturer farms out experimental work to these shops to prevent ever watchful competitive snoopers from finding out what's going on."

Lack of space prohibits our printing more of this extremely interesting article, but the foregoing quotations should be sufficient to prove that the contract shop owner no longer has to solve his problems and struggle to establish his relations with a customer, or the public in general, alone. He is now backed by a national Institute, not the least of whose work has been the active publicizing of the Industry so that it has received genuine recognition.

We feel that it would indeed be *false modesty* if we refrained from pointing out that Tool·Die·Machine PROGRESS has had, and will continue to have, the leading role in achieving this widespread recognition of the Special Tool, Die and Machine Shop Industry.

And what does this public realization that ours is an established national Industry mean to the TDM Contract Shop executive? It means that when a production manufacturer has a job to be done which rightfully falls within the province of the contract shop, he will immediately call on a reputable member of the TDM Industry—and he will do so with full knowledge that he is turning to the man whose one business is to produce the highly specialized tooling devices needed in other industries with the finest precision and skill, and the greatest economy. It means that the customers of the TDM SHOP will be prepared to pay a fair price, and to make sufficient time allowance for the great care necessary in the filling of their orders.

And, as the near future may reveal all too soon, it means that if and when Federal regulations are again imposed upon Industry, the Special Tool, Die and Machine manufacturers will command the respect they deserve as a national Industry, and that the special considerations this Industry requires will be adequately presented to those responsible for drawing up the regulations by its own trade association, the Special Tool, Die & Machine Shop Institute.

Every manufacturer of special **tools·dies·machines** and kindred products is eligible to membership in the Special Tool, Die & Machine Shop Institute. The value of such Industry cooperation must be apparent to every shop owner and executive. Dues for all of 1937 are $10.00. Prompt payment will be appreciated.

Secretary,
Box 3561, Cleveland, Ohio.

THE M. B. SUPER SPEED AIR GRINDER —*Weight, 8½ Ounces*

Thrilling Speeds ● Operates on Air Pressures of 40 to 100 Pounds

Amazing Power ● Speeds of 35,000 to 100,000 R.P.M.

Revolutionary Performance

THE M. B. AUTOMATIC AIR LINE LUBRICATOR AND FILTER

First removes all foreign matter, dust, pipe scale, moisture, etc., from the air line, then saturates the air with any desired volume of oil.

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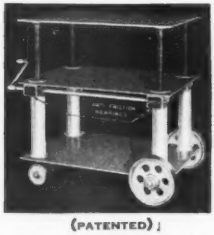
Eliminates Costly Shut-Downs

M - B PRODUCTS

128 E. Larned St. - Detroit, Mich.

REDUCE . . .

Expensive Man Power



(PATENTED)

The Hamilton Portable Elevating Table

- **Moves heavy dies, jigs and fixtures from machine to machine**
- **Levels and supports overhanging pieces of work**
- **Transfers dies from shelf to press in production shops**
- **Always saves time and labor**
- **Safe — Indispensable — Inexpensive**

Two sizes: 2000 lbs. and 5000 lbs. capacity

Write for circular

THE HAMILTON TOOL COMPANY

222 North B Street Hamilton, Ohio

Lyons Machine Appointed a Carboloy Agent

THE Lyons Machine Company of Cleveland, for some time a manufacturer of tungsten carbide tools, has signed an unlimited agency contract with the Carboloy Company, foremost producer of tungsten carbide in the United States.

This arrangement substantially broadens Lyons service, making available for its customers the Carboloy Company's extensive line of standard and special tools, bits and blanks, fabricated in the Lyons shop with modern equipment especially installed for the handling of tungsten carbide.

The Lyons Machine Company ships to all parts of the United States.

The Spring Handbook

(Continued from page 18)

essential to determine the best materials. This is accomplished with special fatigue-testing equipment, as well as chemical analysis and physical inspection. All heat treating operations are directly under the control of the laboratories.

Among B-G-R products are wire springs manufactured of round, square or special section wire usually coiled in the form of a helix or spiral. These include compression, extension and torsion types. The company has special equipment and facilities for producing wire forms of all shapes, and most intricate parts are made complete in one operation on automatic machinery.

Flat spring manufacture is an art in itself, the majority of these being made from spring steel and really belonging to the products classification of heat treated stampings. Equipment used for these is available also for the manufacture of small stampings and when springs are used the company is prepared to quote on complete assemblies.

Die springs constitute an important part of B-G-R's products and the portion of the handbook devoted to these carries engineering formulas for calculating stresses and deflections.

Barnes-Gibson-Raymond will send their Spring Handbook to any executive, engineer, designer or purchasing agent who can make effective use thereof. Address Dept. R.G.K., 6410 Miller Ave., Detroit.

When you order or write about products described in TDM PROGRESS please mention the publication.

New Sheffield Comparator

(Continued from page 19)

swiveled on the column to provide gaging from surfaces other than the self-contained anvil. Standard make indicators in both one-thousandth and three-thousandths range are mounted on the gaging head. Either indicator may be read rapidly to tenths.

A rugged base carries the standard *Sheffield Visual Gage* anvil and special anvils can be supplied for unusual requirements. The steel column carrying the gaging head is pressed into the base. The gaging spindle, of the same design as used in *Sheffield Visual Gages,* is said to have shown no appreciable wear, after more than twenty-five million consecutive gagings on continuous operating tests.

This *Sheffield* comparator gage is a product of the Sheffield Gage Corp., June and East Third Sts., Dayton, O.

Rotary Polishing Machine

(Continued from page 12)

successive index moves the work piece progressively under each of the six polishing wheels.

Mechanism for the indexing and rotating of spindles is hydraulically operated and spindles are controlled in such a way as to allow for variation in the time the work must remain under each polishing wheel. Six polishing or buffing wheels are driven by individual electric motors and a seventh operates the indexing table and the chucking spindle rotation.

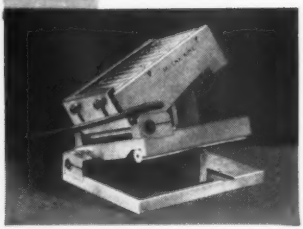
The rotating table itself is mounted on *Timken* Roller Bearings and all spindles are mounted on either ball or roller bearings. All bearings are automatically lubricated by a gear pump which forces oil to all moving parts. The oil is continuously filtered through a *Cuno* oil filter.

The machine can handle work pieces up to 16 inches in diameter and the output will vary from 500 to 1000 pieces per hour, dependent upon the material and the finish required.

The Sommer & Adams Co., 18511 Euclid Ave., Cleveland, O., is a designer and manufacturer of special machinery for many of the production industries, and specializes in continuous types.

DOALL CONTOUR SAWING OFFERS YOU ---
DIE SHOE HOLES
CAMS
2½ HRS COMPLETE
JIGS AND FIXTURES
Thr inside
14hrs
outside
SPECIAL PARTS
AUTOMATIC TRUE CIRCLES
DIES
LETTERS TO DOALL
PRODUCTION schedules are being met in plants that gain the savings possible with Contour Sawing.
In a wide variety of machine tool operations 30 to 75% savings are easily made.
The DOALL Contour Sawing and Filing machine, originally developed for die making, is being used more and more for production, and the examples illustrated represent only a few of the many types of work done daily.
When alert management learns the facts, it reaches but one conclusion — use DOALLS.
"... In all cases the work is finished more quickly and with less effort than was formerly required."
J. Stevens Arms Co., Chicopee Falls, Mass.
FOR ACTION . . .
1. Write for representative.
2. Arrange for our free demonstration of DOALL in your plant.
3. Send for Handbook mailed free when requested on business letterhead.
A HAND BOOK CONTOUR SAWING
CONTINENTAL MACHINE SPECIALTIES
1307 South Washington Avenue
MINNEAPOLIS — MINNESOTA

When you order or write about products described in TDM PROGRESS please mention the publication.



GRINDING COSTS

. . . . have been reduced in every shop in which the MAGNA-SINE is now being used. It is adjustable, in a few seconds time, to any angle—either single or compound—with absolute assurance of precision accuracy. Learn how it will cut production time—yet offer the maximum in satisfactory results—when used on *your* grinders. Write for complete details!

The MAGNA-SINE

ROBBINS ENGINEERING CO.
637 Mt. Elliott Ave. Detroit, Mich.

New Heavy-Duty Continuous Filing Machine Assures Remarkable Accuracy

A new model heavy-duty floor type continuous-motion filing machine, particularly effective in die manufacture, is announced by Grob Brothers. It has a 24″ throat, construction made possible by the use of two 24″ pulleys.

Slippage of the file chain is said to be eliminated because the file chain on which the files are fastened is driven positively, thus counteracting heavy pressure which may be exerted in pressing the work against the files. The files themselves are firmly guided over a hardened file support and their thickness is held to an accuracy of .002″. Such a high degree of accuracy, heretofore unknown in files, produces not only fast but also unusually smooth, accurate cutting.

Not only the file chain but the files themselves are manufactured by Grob Brothers, and they are obtainable in flat, oval and half-round shapes. The

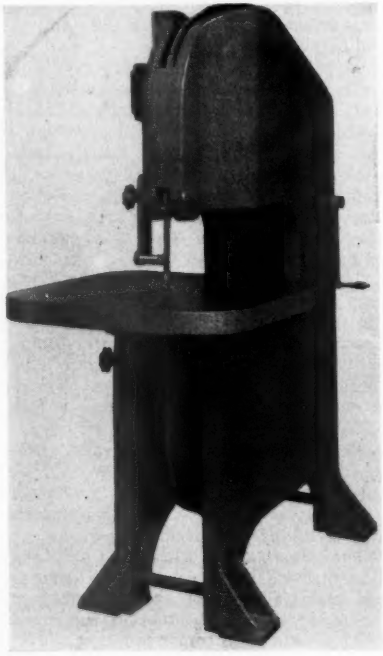
(Continued on page 31)

Let **LYONS** *make your* **CARBOLOY TOOLS**

4 reasons why

- Practical Personal Service
- Best Materials Obtainable
- Quality Workmanship
- Strictly Modern Methods of Manufacture

***LYONS** MACHINE COMPANY*
5601 Tillman Ave. Cleveland, O.
WOodbine 2440



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Dies and Diemakers

(Continued from page 9)

metal pan under the entire engine and transmission made out of one sheet by this new process. The model "T" Ford engine was designed around this new type of stamping, and it was only produced commercially in this one plant in Buffalo. All automobiles up to this time had a cast iron, aluminum, or even bronze oil pan on the engine.

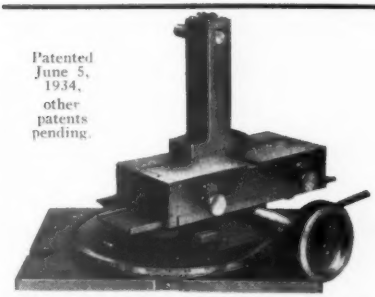
When the Cadillac Motor Car Company began to produce its first four-cylinder engine, its executives of course knew about this new process and they had this man come from Buffalo, buy a punch press and build a set of dies to make the original four-cylinder Cadillac engine oil pan in one piece from sheet metal, and in its day it was considered one of the outstanding feats of the industry. When the Ford Motor Company began to produce two and three and then four hundred cars in one day, this one piece sheet metal oil pan got to be a serious thing, and Mr. Ford started to make them himself. Of course there were not very many men who had ever seen this done, and he had his troubles. These troubles became so serious that eventually he absorbed the Buffalo plant where this had been developed, and also some of the personnel. Some of them worked for him for many years.

This original oil pan setup was transferred to Detroit from Buffalo, together with the men who operated it, about the time the Ford Motor Company reached a production of one thousand cars a day. Here was the eighth or ninth wonder of the world.

Then with the advent of the deep-drawn stamping, the sheet metal industry began to really step out, and it has progressed by leaps and bounds, but the big advance in sheet metal has all occurred since about the year 1910. Today we make many forms of stamping dies but the ones which work the best are the old original cutting dies and plain forming dies. The deep-draw die is still somewhat of a mystery.

There is another industry which furthered the stamping business and that is the telephone. In the early part of the century, telephone promotion was at its height. Almost every village, town

(Continued on page 33)



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- Heat Treating
- Annealing
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1225 Marquette St. TELEPHONE: HE 6601 Cleveland, Ohio

Contour Sawing

(Continued from page 11)

the lay-out so that stock can be filed evenly from all sides.

6. Change the contour machine from its sawing function to continuous filing. File the "land" on the punch and die.
7. Accurately fit the punch to the die.

The die is secured to the shoe in the regular manner. The punch can either be screwed and doweled to the pad or inserted in the pad or it can be arc-welded to the pad.

Fig. 2 illustrates an actual example of the enormous savings made possible by cutting the punch and die at the same time. Note that the "starting hole" completely vanishes under this technique. The two parts were sawed at once in one hour and forty minutes. Time for filing to a fit would be 2½ hours.

A conservative estimate of the time required for doing this work by conventional methods would be from 8 to 10 times greater.

Advantages

1. Punch and die roughed out, reducing two separate jobs to one operation.
2. Contour sawing produces less strains in steel than other machin-

(Continued on page 32)

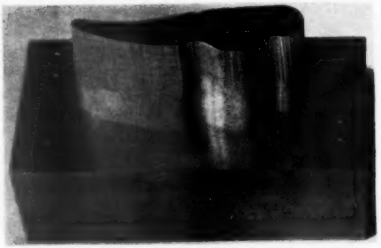

Fig. 4—2" thick die complete on Doall Contour Machine in 3 hours, 20 minutes.

Fig. 5—Only ½" thick, yet slug from die can be used for the punch.

You do not pay for the hole when you use BISCO TOOL STEEL TUBING

We stock also:
- S. A. E. 52100 Tubing
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Stock Up to 14" O. D. — 2" Wall

THE BISSETT STEEL CO., CLEVELAND
Manufacturers of BISCO *Tungsten Carbide Dies and Tools.* • *Fine Tool Steels.*

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Filing Machine

(Continued from page 28)

machine uses also chains of abrasive stones of the type which are used to lap dies after they have been hardened.

For internal filing, when it is necessary to insert the files into an opening, or when they have to be changed, the tension is readily released with the hand lever shown on the right side of the machine.

All revolving members are mounted on ball bearings and the machine is driven by a ½ HP motor. Power from the motor is transmitted by V belt drive, and three speeds are provided. The distance from the floor to the table is 45″. The table is 30″ x 30″, the total height of the machine is 77″ and the weight 2000 pounds net.

A more detailed description of this new model large throat machine may be obtained by writing Grob Brothers, Grafton, Wis.

Carboloy Accuracy

(Continued from page 17)

ine dealing with increments of such an infinitesimal character!

The tungsten carbide is thoroughly mixed with cobalt, which forms the bond. It is then placed in a steel mold and squeezed in a hydraulic press. Then the blank is semi-sintered or partly baked, making its hardness comparable to chalk, after which it is formed plus grinding stock, allowing approximately 15% for shrinkage. Now the blank is given a final sintering in hydrogen atmosphere at controlled temperature for a definite period. When these blanks are finished they have a hardness ranging from 87.5 to 92.5 Rockwell "A," depending on the amount of cobalt or binder used.

The Carboloy tip is now ready to be ground, copper-brazed in the shank and finish ground. This must be done with discrimination on first class equipment. Then these tools, properly designed and used will pay out in money the accuracy, care and experience used in fabrication.

The demand today is for more production, but it must have finer finish and be more accurate than the shipment of yesterday. Tungsten carbide, whose very heart and soul are quality and accuracy, is most certainly the modern requisite for modern production.

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SWISS FILES

★ GROBET SWISS FILES have won a reputation for supremacy wherever exact and precise work must be done with files.

Ask for our catalog YN, the most complete of its kind, showing more than 4,000 different shapes, sizes and cuts of precision files, also files for filing machines, rotary files, etc.

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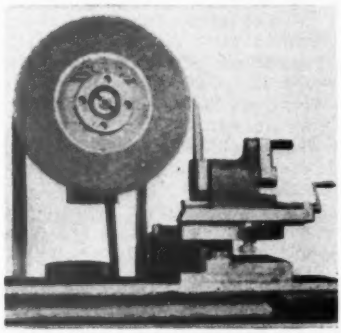
THE ROYAL DRESSER



. . . quickly and accurately dresses grinding wheels in Concave and Convex forms, Angles and Radii or combinations.
Time saved by not having to set up inadequate fixtures easily pays for the Royal. *Write for circular and price.*

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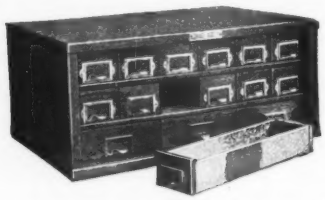
CABINETS for every conceivable purpose are illustrated and described in W. C. Heller & Company's new catalog. Of particular interest to TDM Shops are those made especially for small tools, parts and supplies, of which one style is illustrated; and those for blueprints and drawings.



There are many arrangements of drawers and the drawers themselves are obtainable with compartments and partitions suited to the material to be stored. Carefully worked out systems comprising entire stock room layouts are available.

Cabinet and drawer construction is such as to insure satisfactory service for a business lifetime—of solid oak and galvanized steel so fitted that they insure against pulling apart, swelling, buckling or shrinking.

For Catalog No. 38F address W. C. Heller & Co., 1710 Broad St., T.D., Montpelier, O.

Contour Sawing

(Continued from page 30)

ing methods used. The saw produces no distorting shock or heat.

3. Since the grain of the punch parallels the grain of the die in the completed die (just as when it actually was part of the same block) the effects of strain and distortion from machining and hardening are minimized.
4. The angle of the saw cut in the die makes it unnecessary to spend time filing die clearance.
5. The material in the punch is saved and time spent to secure a piece of steel suitable for a punch is eliminated.
6. Irregular shaped dies and dies with many curves can be cut with the contour saw better and faster than by any other method.

This system of using the die slug for a punch is in use in many plants and has proven its worth. It is not applicable to all dies — square or rectangular dies can easily be finished on other machines, but the average irregular shaped blanking die can be completed at a great saving in time and cost.

Particular Applications

Dies for trimming forgings fit ideally into this method. The trimming die for forgings is generally of considerable thickness and has from 4 to 10 degrees taper or forging clearance. This taper is put into the die by the original saw cut. Thus, these trimming dies can be cut efficiently and at great savings.

Plain blanking dies, progressive dies, shaving dies, lamination dies, parting dies, trimming dies, and "Continental Process" dies have been made with this new technique profitably and in the shortest possible time.

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TOOLS · DIES · SPECIAL MACHINERY · ·
Our strictly modern equipment includes: **3 Lucas Precision Horizontal Mills—largest #42 oversize pattern · #6 Swiss Jig Borer—the largest capacity · Gray Maxi-Service Openside Planer—table capacity 72″ x 240″ · *May we estimate your work?***
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We Specialize in the Hardening of High Speed Steel Lamination Dies

- CARBONIZING
- HEAT TREATING
- HARDENING
- ANNEALING
- CASE HARDENING
- COLORING

Dies and Diemakers

(Continued from page 29)

and city was sold a complete local telephone system. Most of these have since been consolidated into the present nationwide system, but thirty years ago these small telephone systems were locally owned outfits and provided a market for large numbers of telephones, switchboard parts, etc. With this demand for large numbers of the small parts required for the switchboard mechanisms and the telephone instruments, the diemaker was called in to devise methods for economical production, and as a result, there was developed for the telephone manufacturing industry its own technique of producing small irregular parts of sheet metal, usually of copper and brass.

The incandescent lamp industry also came along at about the same time as the telephone, and from the very start almost all electric light sockets and switch mechanisms that were used commercially were produced with dies. Some of these small parts in the electrical world were produced by the million, and this brought about the development of what is known as the progressive die, which later was adopted by the automotive industry when they got into real high production. However, the electrical industry is still the largest user of progressive dies, and while we are talking about this industry, we must not forget the electric motor. Every electric motor in operation today has in it anywhere from a few hundred to several thousand stampings.

When the automobile industry first started it used the old time coach body, usually made from wood panels, and when fancy ones were wanted, thin layers of wood with cloth and glue between were pressed into contours between wooden forms. These panels were assembled to the frames. This may have been satisfactory when only one or two of them a week were wanted, but when someone asked for five hundred of these complete bodies a day, something had to be done about it. The larger producers of automobiles then began to use the deep-draw process, which they had learned from manufacture of the engine pan or crank case, to produce bodies from sheet metal. Panels were made individually and nailed onto a wooden skeleton. Automobile bodies were produced in that manner for more than twenty years, and it is only in the very recent years that they have been produced entirely of metal. As the industry progressed in deep-draw technique, more and more graceful body designs were possible, and then came streamlining—and many die-

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***STAR TOOL & DIE WORKS**
2532 Twenty-Fourth St. LAfayette 1716
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Small, Medium and Large Dies
Special Machinery

*See larger display advertisement also.

makers became bald-headed or went to insane asylums—and the end is not yet.

Now we will take up the question—who made all these dies? The first sheet metal worker of modern times mentioned in English literature was the village tinkerer who went about mending pots and pans, and upon special order he would take a flat sheet of copper or brass and beat you out a nice new shiny cooking pot—if you gave him enough time. On the European continent he was a coppersmith and of course this trade goes back far into antiquity, the tools consisting principally of hammers.

The Yankee coppersmith or tinsmith soon found that he could fasten a couple of pieces of iron to the side of a bench or onto a block of wood and make a straight break in a piece of metal, with less labor than if he laid it over the edge of the bench and used a hammer. With the advent of the early machine tool period, this probably worked out as the forerunner of our present hand brake. Another development was a series of different kinds of rolls mounted on shafts which could be revolved by hand for putting in beads and other decorations.

After the invention of the turning lathe, it was not long before metal spinning became more or less common, but there was very little done in a commercial way in the deep-forming of metal from the period of the old hammer process to that of the spinning lathe, until the development of the original sheet metal automobile engine oil pan. With the beginning of the use of tin cans in the oil industry there was a demand for diemakers, but who had ever heard of a diemaker?

There were mechanics who were more or less skilled in the working of iron and there were also blacksmiths, and it was some of these men who undoubtedly made the original dies. It was not until well into the twentieth century that anyone was really known as a diemaker—and the same is true of the term "toolmaker." If you didn't like the tool you had for your lathe, or the shape of it, you took it out to the blacksmith shop, forged it out to suit yourself and hardened it to please your own idea—you were either a thorough mechanic or you were not.

(Continued on page 37)

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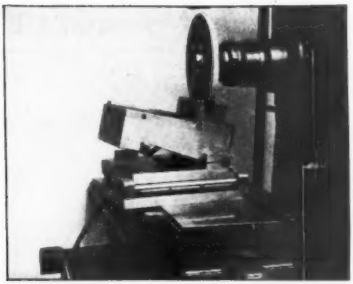

Fig. 3

New Magnetic Chuck

(Continued from page 13)

wheel costs. Number 3 illustrates a typical set-up for grinding a compound angle slot. Three angles were necessary for this particular operation—6° 15′ on the horizontal plane with 3° 15′ and 10° in vertical adjustments. Illustration Number 4 shows the single angle Magna-Sine again, this time in use for grinding a female master dove-tail gage. Adjusted at an angle of 60°, the gage is in position to be ground by a wheel dressed only at an angle of 30°.

In any tool-room where grinding operations, honing, lapping, and other operations, and inspection of finished work necessitate a variety of angular set-ups, the time-saving advantages and the accuracy of the MAGNA-SINE will unquestionably facilitate regular production requirements.

Michigan Summer Home For Sale

ATTRACTIVE summer home on beautiful Lake Huron Shore. Very conveniently situated, ten miles north of Port Huron, sixty-five from Detroit. Easy driving distance from Ohio and Indiana cities.

Lot has 100 feet of lake frontage with fine sand beach and clean, clear water and depth of 450 feet to Lake Shore Drive.

House has large living-room with cobble fireplace, an all-window dining room, kitchen, three bedrooms and bath. Has porches, French doors and windows on all sides. There's always a delightful breeze. Separate cabin for servant. Garage.

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Systematic care of tools pays the employer in increased production. The men will do more work and do it more easily when they care for their tools in a *Gerstner* Chest. The choice of particular men for 30 years. *Free Catalog.*

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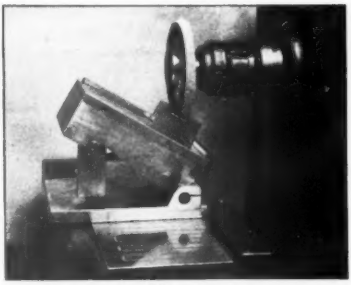

Fig. 4

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NEW OPENSIDE PLANER EQUIPMENT
12 ft. x 48″ Capacity

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*THE HAMILTON TOOL COMPANY
220-222 North B Street
Designers and Builders of
Tools, Dies, Jigs, Fixtures, Special Mach'y
The Hamilton Portable Elevating Table

Dies and Diemakers

(Continued from page 34)

With the advent of the high production period, there were not enough mechanics to go around, therefore processes had to be developed whereby unskilled labor could be trained to produce "skilled" products. Here was the start of the specialist in the mechanical industries. Some of the better mechanics figured out ways and means by which parts could be produced economically by unskilled labor, provided the proper tools were put into this unskilled laborer's hands, and he was properly instructed. After these tools were made, someone had to care for them and when one wore out, make another; these men acquired the name of toolmakers. In these early days of toolmaking, among all-around mechanics this new toolmaker was known as a lazy mechanic, but it was only natural that when dies were to be made, some of these same lazy mechanics or toolmakers were the logical men to get to make them. Next began the production of precision machinery and the new toolmaker found that most of the things that he had to make could be produced on some of this new machinery with relatively little hand work to be done afterwards, therefore he became largely a machine hand and he did not like to make dies because die-making was, and still is, pretty much a hand job.

The native born American is naturally an ingenious fellow—some say it's a slightly lazy tendency—and he will not do anything by hand that he can get some kind of a machine or other contraption to do for him. If we were not constituted that way, we would not have our present highly developed industrial equipment. In those days when the better American mechanics did not like to make dies, they were built by men who did not want to work as machinists and they were not quite good enough to be called first class toolmakers. Then what about all this hand work which was so necessary for die making? It was the period of easy immigration laws. Mechanics were still learning their trades in Europe and their methods included a great deal of hand work. European workers could produce with a cold chisel and a hammer and a file, things which the better grade of American mechanics were forgetting how to do, and willingly so, therefore the European mechanic, when he came to this country, stepped right into the die industry, for which, while he did not know much about it, his training particularly fitted him.

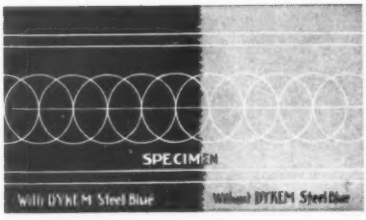
The first generation of European mechanics had the requisite skill and also were willing to do this kind of hand work because the pay was relatively high, and they readily learned a great deal about it. Since the World War, with very rigid immigration restrictions, very few first-grade European mechanics have come to this country. The second generation of these former European mechanics is just about as much American as any of us, and they have the same tendencies—in other words, they do not go in for the learning of a trade for four or five years. Thus we have arrived at the present day. *(To be concluded in April.)*

Heads Billings & Spencer

(Continued from page 16)

ence in metallurgical field work, having been connected not only with Union Drawn Steel but with the Crucible Steel Co., Jones & Laughlin Steel Corp., American Bridge Co., and Mesta Machine Co. A graduate of Princeton University, he also holds a B.S. in metallurgical engineering from Carnegie Institute of Technology. As chairman of the sub-committee on magnetic testing of the American Society for Metals, he cooperated in writing an article on this subject for the Metals Handbook, a publication of the society.

Mr. Purtell is a member of the American Society for Metals, American Supply & Machinery Association, Rotary Club, Hartford Club, and is active in Veteran organizations.



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Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in a sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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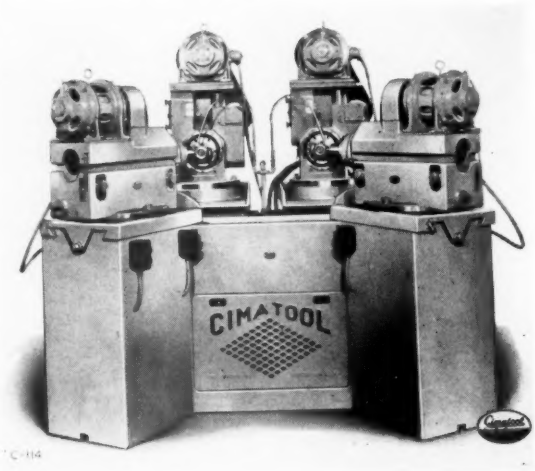
Cimatool Announces New Higher Production Chamfering Machine

Chamfering and burring gears at production speeds ranging as high as 600 teeth per minute is reported possible on the new line of high speed gear chamfering machines recently announced by The Cimatool Company, a member of the TDM Industry.

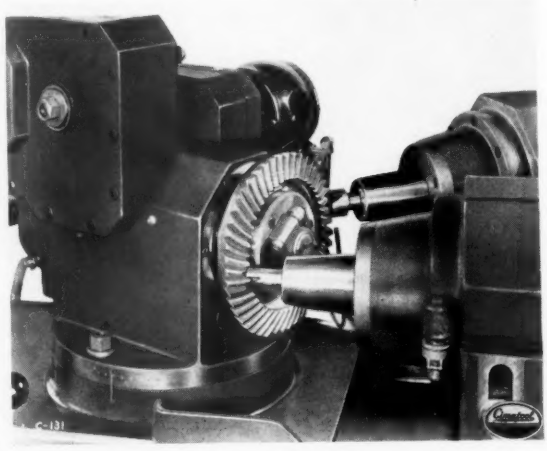


Three types operated manually, hydraulically, or by air, are being manufactured. All machines utilize hollow mill cutters and the cutter heads are provided with rapid traverse to and from cutting position. During the cutting period the spindles rotate while locating against an adjustable back-stop in a stationary position.

Model 4-A, the smallest type, has a single work head and a single cutter spindle and one base, while 4-B has two cutter spindles in a single head, so designed that they simultaneously machine a single part. Model 4-C really is comprised of two 4-A machines in a single base. This construction enables one operator to load one work head while the other half of the machine is machining another gear, thus reducing the unproductive periods considerably. It is possible to handle two entirely different types of gears on this machine, as well as to follow a sequence of different chamfering operations.

The construction of the work head is such that it not only indexes the part but also feeds it to the cutter. An ingenious mechanism providing the smooth action of a worm and worm wheel accomplishes the indexing function. A constant mesh index is used which eliminates ratchets, loose dogs, etc., and assures a positive mechanical type of construction. The illustrations herewith are of the 4-C model and a close-up of the work head on a 4-B machine.

A more detailed description of these machines and their operation may be had from The Cimatool Company, June and East Third Sts., Dayton, Ohio.



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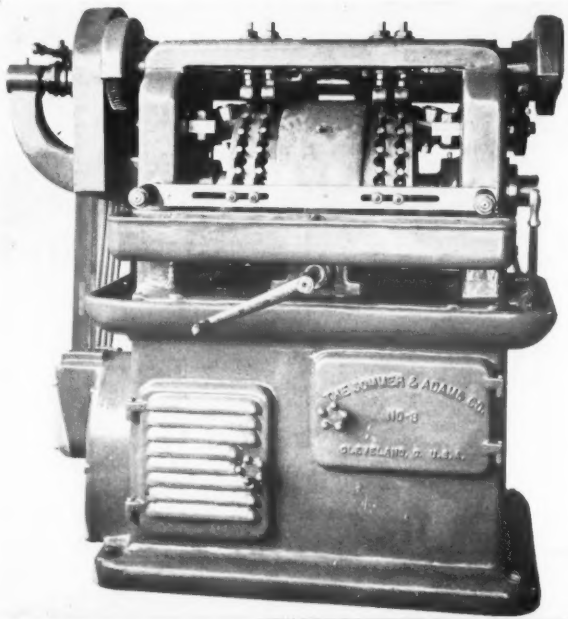
Adopt Continuous Milling for LOWER PRODUCTION COSTS



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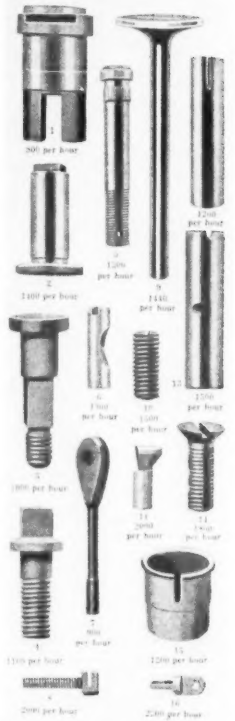

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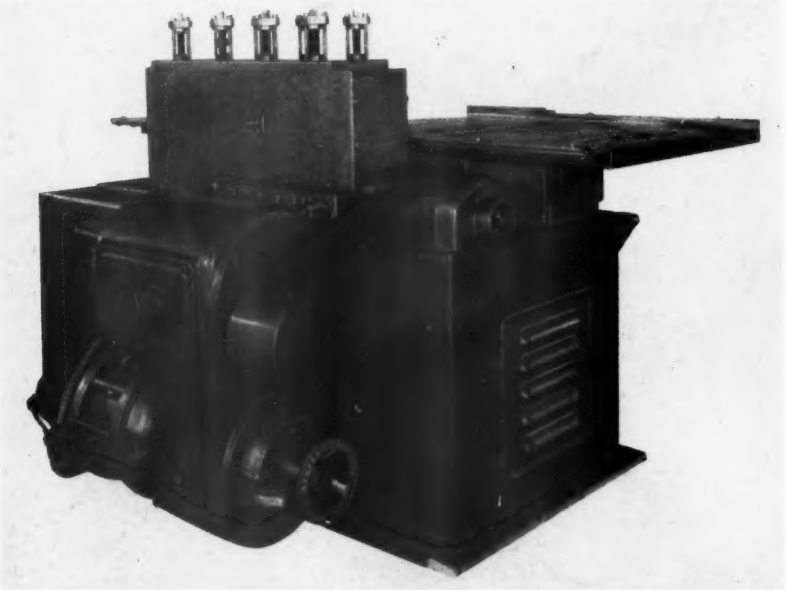

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